

## FARM SAFETY

Bunker silo safety measures must be in place to be safety compliant

# Bunker silo safety

By Karl Czymmek and Curt Gooch

While all types of silos have particular health and safety concerns, most farms subject to Occupational Safety and Health Administration (OSHA) inspection are likely to store some or most forage in bunker silos.

For purposes of this article, bunker silos are any type of flat storage or trench for fermented feeds that may be completely above ground or partially or fully constructed in an embankment.

When OSHA first announced the Local Emphasis Program (LEP) inspections for NYS, they specifically referred to a Land Grant publication indicating that silage should not be piled above bunk walls, and that railings should be installed on the top of bunk walls, along with other safety measures.

Many of the elements cited would be very difficult if not impossible for most farms to implement without major engineering, construction, possible expansion of bunks, or enlarging the CAFO required grass filter area to accommodate added bunker runoff, and sufficient lead time, to accomplish these items.

In short, our position was that the practices suggested in the publications were intended to be good ideas, not industry standards. Further, many of these practices could not be readily adopted by most farms in the short run, and that the industry needs time to work out what is feasible, what could be changed in new bunks, and what may be changed for existing bunk structures.

Certain activities around bunker and trench silos present serious or fatal fall and/or rollover hazards, and the ideas OSHA cited would help address some of the hazards.

However, there is also recognition that feasible solutions to address these hazards will take ingenuity, significant engineering effort, site-specific planning, time and capital to be developed and implemented.

All dairy operations with bunker/trench silos are encouraged to implement the following guidelines, and, for the time being, OSHA has stated that their inspectors, under the LEP or other investigations, will look for the following if they visit your farm:

1) Annual Bunker Silo Safety Training Program - All staff that are supervised by or under the direction of dairy managers with duties in the following areas need to be trained at least annually in:

- a) operation of trucks and packing tractors during silo fill;
- b) covering bunks after harvest;
- c) removing cover material such as plastic and tires; and
- d) working near bunk faces, using defacers, and taking forage samples.

2) Tractor Safety Equipment - Make sure packing tractors have ROPS and safety belts that are in working order and are used by operators.

3) Silage Truck Safety Equipment - Make sure all mirrors are in place, tires are properly inflated, and all lights and back up indication equipment work.

4) Bunker Silo Structural Inspections - Visually inspect bunkers for obvious structural defects and repair those that could lead to failure before beginning the ensiling process.

5) Bunker Silo Site and Sounding Area - Visually inspect the bunk silo site and adjacent areas for specific safety concerns, try to eliminate the hazards and make sure relevant employees are informed of

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## FYI

■ **Karl Czymmek** is a senior Extension Associate with PRO-DAIRY. Email him at [kjc12@cornell.edu](mailto:kjc12@cornell.edu).

■ **Curt Gooch** is a senior Extension Associate with PRO-DAIRY. Email him at [cag26@cornell.edu](mailto:cag26@cornell.edu).

changes or any hazards that cannot be eliminated.

6) General Communications - Inform all non-essential personnel to stay out of and away from the bunker and post warning signs where practical.

Though written records relating to bunker silo safety are not legally required by OSHA, farms will be in the best position by keeping files that include: the instructor(s) and dates of training, topics covered, materials used for training/or sources of training, and signatures by all who attended.

Additionally, farms should consider having complete, accurate, written procedures for bunker silos, including filling, covering, and unloading and be sure that employees have been trained on following them.

Farms with silage bags, drive-over piles and tower silos will

have specific safety related items under an OSHA inspection, many of which are included in the list above.

Based on the discussions with OSHA, it is clear that the dairy industry will need to make safety related changes in bunk design and standard operating procedures (management) in the coming years. While the nature of many of these changes is uncertain at this time, it would be helpful for each farm to give consideration to how their bunker systems can be made safer.

A technical work group has formed in NYS to evaluate current options and to develop other viable solutions. We will distribute and post new information as it becomes available on PRO-DAIRY, Northeast Dairy Producers Association (NEDPA), New York Center for Agricultural Medicine and Health (NYCAMH) and other Web sites. □

## Work safely around manure gases

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■ A standby person should be in constant contact and ready to lift the worker to safety with mechanical lifting equipment (winch, hoist, or pulley), and

■ Anyone entering a manure pit should wear a safety belt or harness with a lifeline tied to the mechanical lifting device.

### Entering a confined space

If confined space entry is necessary, this may involve draining of the tank(s) or digester, and lockout of pumps or agitators. Feed to the raw manure tank should be discontinued. Perhaps manure could be diverted to storage in the interim, if necessary. Overall, if entry does become necessary, written procedures should be developed for confined space entry with the appropriate lockouts and isolation procedures.

Mechanical ventilation is the preferred method to achieve an acceptable atmosphere. However, entry can also be accomplished using a supplied-air respirator. The worker wearing the respirator will need to be clean-shaven where the respirator seal meets the face. Even one day's growth of beard may allow leakage of the respirator, which is comparable to not wearing a respirator at all.

### Maintaining testing equipment

Working safely around manure requires maintaining proper equipment for testing. The most important elements of gas detector maintenance are function ("bump") testing and calibration. Bump testing involves using a prepared gas mixture of known composition to test that the sensors are working. All gas sensors lose sensitivity over

time, and even more rapidly in the field, due to temperature, humidity, dust, dirt and rough handling. Calibration adjusts the readings to account for these changes and to monitor the conditions of the sensors so that they can be replaced as needed.

Sensor type	Typical life span
Oxygen sensors	1.5 – 2.0 years
Catalytic bead combustible gas sensors	3 – 5 years
Electrochemical toxic gas sensors	1 – 4 years
Infrared gas sensors	5 – 10 years
Photoionization gas sensors	2 – 4 years

### Resources:

■ USDOL. OSHA. 29 CFR 1910.146 -- PERMIT-REQUIRED CONFINED SPACES. <http://www.osha.gov>

■ USDHHS/CDC/NIOSH. Preventing Deaths of Farm Workers in Manure Pits

■ <http://www.cdc.gov/niosh/90-103.html>

■ USDHHS/CDC/NIOSH. NIOSH Warns: Manure Pits Continue to Claim Lives. <http://www.cdc.gov/niosh/updates/93-114.html>

■ USDHHS/CDC/NIOSH. Hydrogen Sulfide in Manure Handling Systems: Health & Safety Issues. Fact Sheet S-1. [http://www.manuremanagement.cornell.edu/Pages/Resources/Resources-Fact\\_Sheets.htm](http://www.manuremanagement.cornell.edu/Pages/Resources/Resources-Fact_Sheets.htm)

■ Brown, N. J. 2007. Conducting a Safety Walk-Through on a Farm: Hazards of the Manure Handling System, Anaerobic Digester, and Biogas Handling System

A SELF-ASSESSMENT GUIDELINE FOR FARMERS <http://www.manuremanagement.cornell.edu/Pages/Topics/Safety.html>

■ ANSI/ASABE S607 Oct2010 Ventilating Manure Storages to Reduce Entry Risk is now available at [www.asabe.org](http://www.asabe.org) □